Mars Pathfinder continues investigations despite obstacles

By Elizabeth Soutter

In spite of a few communications glitches, the Mars Sojourner rover has accomplished all of its primary science goals and is well on its way to completing its extended mission objectives.

A series of computer resets was the cause of several terminated downlink sessions between the rover and scientists at NASA's Jet Propulsion Laboratory during the week of July 10. The software is designed to reset itself if it fails to perform a function.

"The resets on the lander were caused by a software task that was unable to complete the task in the allotted time," said Flight Director Brian Muirhead. "We found that the task was being cut short because it had not been given a high enough priority to run through to completion."

The resets, while not harmful to the software or the rover, caused time delays.

Programmers moved to a serialized approach when transmitting commands to the rover, having the lander do only one thing at a time. A software patch was sent to the computer that provided additional programming to help the lander accomplish its directives without causing a reset.

The Pathfinder is halfway to completing the 30-day prime mission.

JPL scientists report that the Sojourner rover has performed to the highest expectations of its design. In addition to its computers and transmission antennas, the rover carries an Alpha Proton X-ray Spectrometer and an Imager for Mars Pathfinder camera.

The Alpha Proton X-ray Spectrometer has been employed to analyze the mineral content of the rocks near the Pathfinder landing site. By commanding the rover to apply the instrument to the surface of rocks, scientists on Earth are able to gain a wealth of information and clues to the ancient geologic history of Mars.

The rock Barnacle Bill—named for its pock-marked surface—has been classified an andesite. Andesite is a type of lava found in abundance in the Andes Mountains of South America. The andesite classification was derived from chemical testing performed on Barnacle Bill's surface by the Alpha X-ray Spectrometer. Barnacle Bill could be a true andesite—a uniformly volcanic rock—or it could be a mixture of granite and basalt, which would classify it as a sedimentary rock. A sedimentary rock could be formed if ancient flood waters mixed sediment particles together and wore them into a smooth rock. Sedimentary rocks also could be formed as the result of a large impact which pulverized and mixed different types of rocks in andesitic proportions. Either of these alternatives would provide clues into the geologic history of Mars.

When attempting to study the Yogi rock on July 11, the Sojourner rover began to climb the boulder before automatically stopping itself. The vehicle was able to reposition itself and apply the Alpha X-ray Spectrometer. Data from Sojourner's encounter with Yogi is still being analyzed to attempt to determine its geologic makeup. Among other named rocks to be studied are Flat Top, Half Dome, Scooby Doo, Wedge and Shark.

Mars Pathfinder Internet engineers report that worldwide interest in the mission peaked on July 8 with 46 million hits in one day. The Mars Pathfinder mission home page is at: http://mpf.www.jpl.nasa.gov

Crew checks first station element at KSC

The crew of STS-88, the first International Space Station assembly mission, traveled to the Kennedy Space Center recently to examine a connecting module called Node 1 that will be the first U.S.-built station component to be launched.

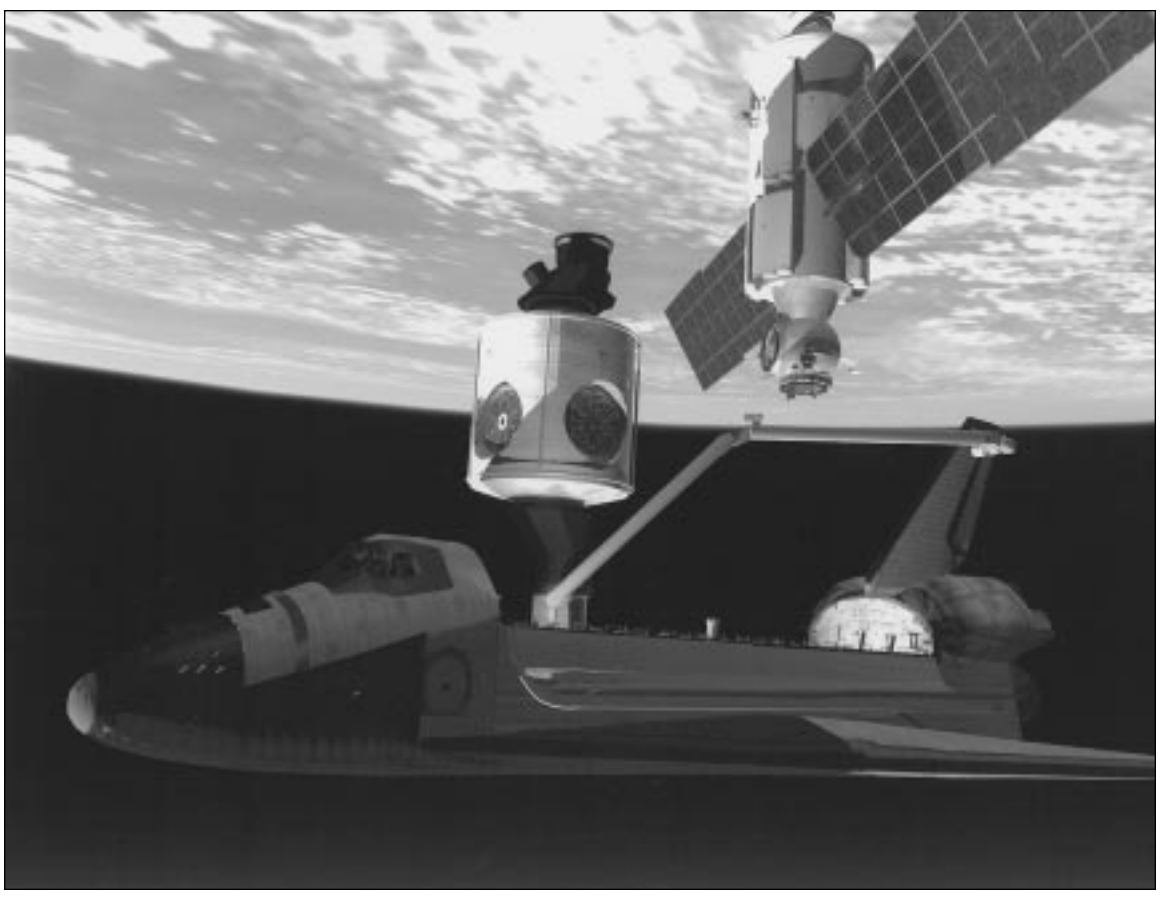
Commander Bob Cabana, Pilot Rick Sturckow and Mission Specialists Jim Newman and Nancy Currie were briefed on the prelaunch processing procedures that will be carried out before the node is installed in *Endeavour*'s cargo bay.

Node 1 is currently scheduled to lift off aboard *Endeavour* in July 1998, along with Pressurized Mating Adapters 1 and 2. The 18-foot-diameter, 22-foot-long aluminum module was manufactured by the Boeing Co., at the Marshall Space Flight Center's International Space Station Manufacturing Facility. It was transported to KSC this month to begin a year of launch preparations. Once in orbit, Node 1 will function as a connecting passageway to the living and working areas of the International Space Station. The six hatches on Node 1 will serve as docking ports for the U.S. laboratory module, U.S. habitation module, an airlock and other space station elements.

Cabana, Sturckow, Currie and Newman will join Jerry Ross for the seven-day STS-88 mission that will be highlighted by the mating of the node to the Functional Cargo Block which will have been launched from Russia about two weeks earlier. During the mission Currie will first use the shuttle's mechanical arm to move the node from the aft cargo bay to a docked position atop the Orbiter Docking System. Cabana will then fly *Endeavour* to a rendezvous with the Functional Cargo Block, moving to within 35 feet to allow Currie to use the arm to capture the Functional Cargo Block. Once captured, Currie will position the Functional Cargo Block into a docked position with the node's upper Pressurized Mating Adapter. During the ensuing days, Ross and Newman will perform three space walks to connect power and data cables between the node and the Functional Cargo Block.

NASA Photo KSC-97PC-942 JSC Photo 97E-02492

Above: Members of the STS-88 crew examine Node 1 of the International Space Station in the high bay of KSC's Space Station Processing Facility. From left are Mission Specialist Jim Newman, Commander Bob Cabana, Mission Specialist Nancy Currie and Pilot Rick Sturckow. The module is the first element of the station to be manufactured in the U.S. and the first scheduled to be launched on shuttle. Once in space, the Node 1 will function as a connecting passageway to the living and working areas of the station. The six hatches on the Node 1 will serve as docking ports to the U.S. laboratory module, U.S. habitation module, an airlock and other space station elements. Below: *Endeavour* prepares to capture the Functional Cargo Block using the shuttle's remote manipulator system arm in this artist's depiction of the first station assembly flight during STS-88. Once Mission Specialist Nancy Currie captures the Functional Cargo Block she will dock the module to the conical mating adapter on top of Node 1 in the shuttle's cargo bay. In ensuing days, three space walks by astronauts Jerry Ross and Jim Newman will be performed to make power, data and utility connections.



Second station part begins launch prep

The first of two Pressurized Mating Adapters for the International Space Station arrived last Friday, July 25 at the Kennedy Space Center from manufacturer McDonnell Douglas in Huntington Beach, Calif.

A pressurized mating adapter is a cone-shaped connector that will be attached to Node-1—the space station's structural building block—during ground processing in KSC's Space Station Processing Facility. Node-1 with the adapter attached will be the first element of the station to be launched aboard the shuttle in July 1998.

The mating adapter will be the connection point between Node-1 and the U.S. financed, Russian-built Functional Cargo Block, which will be launched from Russia as the first station element to be placed in orbit. The adapter will house space station computers and various electrical support equipment and eventually will serve as the passageway for astronauts between the node and the cargo block.

"PMA-1 brings with it the computers that are the intelligence for the node," said Glenn Snyder, STS-88 payload manager. "We're looking forward to testing with those computers."

For processing at KSC, the adapter will undergo initial acceptance testing. Then, in early September, it will be mated to Node-1 and a series of integrated tests will be conducted.

"We're pleased that the first mating adapter is now at Kennedy," said John Elbon, test integration leader for McDonnell Douglas. "It is the next of three elements of flight hardware necessary for the STS-88 mission."

The second adapter, the final element of STS-88, is expected to arrive at KSC this October. It will be attached to Node-1 in the processing facility. This second adapter will serve as a shuttle docking port during the construction and resupply of the space station.

The asymmetrical open-ended cone-shaped pressurized mating adapters are about seven feet long, five feet in diameter at one end and nine feet in diameter at the other. Each adapter consists of five individually machined and welded aluminum ring forgings, thermal insulation blankets and 52 fittings for electrical connections. The outer covering is a double-wall aluminum sheet to protect the adapters from strikes by space particles.

Endeavour carrying Node-1 with the two attached adapters, is targeted for launch in July 1998, approximately two weeks after the Functional Cargo Block is launched from Russia.

Explorer to study matter

NASA's Advanced Composition Explorere, or ACE, is set to launch Aug. 25 to study interstellar matter and its sources.

"The Advanced Composition Explorer observatory is designed to sample the matter that comes near the Earth from the Sun, from the apparently, but not actually, empty space between the planets and from the Milky Way beyond the solar system," said Don Margolies, ACE mission manager at Goddard Space Flight Center.

ACE has six high-resolution particle detection sensors and three monitors. It will sample low-energy particles of solar origin and high-energy partilces. The observatory will be placed into an orbit at the L1 libration point, which is almost a million miles away from Earth, about 1/100th the distance from the Earth to the Sun. ACE's instruments and experiments will work together to add to scientists' understanding of solar events and the evolution of galactic matter.

Scientist dies in Australia

Planetary scientist Eugene Shoemaker, 69, was killed in a two-car accident near Alice Springs, Australia, on the afternoon of July 18. His wife Carolyn Shoemaker suffered broken bones, and reportedly is hospitalized in stable condition.

A geologist by training, Shoemaker is best known for discovering, with his wife Carolyn and colleague David Levy, a comet near Jupiter. Comet Shoemaker-Levy 9 was broken up by tidal forces from Jupiter, and its fragments collided with the planet in July 1994.

"Gene was one of the most renowned planetary scientists in the world, and a valued member of the NASA family since the earliest days of lunar exploration," said NASA Administrator Daniel S. Goldin. "His work on the history of meteor impacts and the role that they play in the evolution of the Solar System is a fundamental milestone in the history of space science.

"Gene was an extremely articulate man who could explain the wonders of the planets in simple language that anyone could understand and get excited about," Goldin said. "Although he never realized his dream of doing field geology on the surface of the Moon, all future exploration of that rocky world owes a debt to his pioneering spirit."

Shoemaker's signature work was his research on the nature and origin of the Barringer Meteor Crater near Winslow, Ariz., which helped provide a foundation for cratering research on the Moon and planets. This work led to the establishment of a lunar chronology, allowing the dating of geological features of its surface.

Shoemaker took part in the Ranger lunar robotic missions, was principal investigator for the television experiment on the Surveyor lunar landers (1963-1968), and led the geology field investigations team for the first Apollo lunar landings.